

REMARKS

Favorable reconsideration of the application is respectfully requested in light of the amendments and remarks herein.

Upon entry of this amendment, claims 1, 2, 4-7, 9-12, and 14 will be pending. By this amendment, claims 3 and 13 have been canceled; claim 1 has been amended; and claim 14 has been added. No new matter has been added.

§102 Rejection of Claim 13

In Section 4 of the Office Action, claim 13 stands rejected under 35 U.S.C. §102(e) as being anticipated by Gorin *et al.* (U.S. Patent No. 6,021,384; hereinafter referred to as “Gorin”). Claim 13 has been canceled, thereby obviating the rejection.

§102 Rejection of Claim 13

In Section 5 of the Office Action, claim 13 stands rejected under 35 U.S.C. §102(e) as being anticipated by Ehsani *et al.* (U.S. Patent Publication No. 2002/0128821; hereinafter referred to as “Ehsani”). Claim 13 has been canceled, thereby obviating the rejection.

§103 Rejection of Claims 1-5 and 9

In Section 7 of the Office Action, claims 1-5 and 9 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jiang *et al.* (U.S. Patent No. 6,539,353; hereinafter referred to as “Jiang”) in view of Ehsani. Claim 1 has been amended to address the rejection.

In the Background section of the Specification, it is stated that “[o]ne major drawback of conventional methods and devices for large vocabulary speech recognition is

the large complexity and the large number of possible candidates of speech fragments or elements to be searched for and to be tested. Without limiting the scope of subject-matter and therefore the scope of vocabulary, all possible candidates for speech elements or speech fragments have to be evaluated by distinct searching techniques.” *Background of the Specification, page 3, lines 1-6.*

To address the above-described drawback of the conventional large vocabulary speech recognition, embodiments of the present invention provide methods and apparatus for recognizing speech. For example, the steps of method claim 1, as presented herein, include:

- (a) *receiving* a speech phrase;
- (b) *generating* a signal being representative to said speech phrase;
- (c) *pre-processing and storing* said signal with respect to a determined set of rules;
- (d) *generating* from said pre-processed signal at least one series of hypothesis speech elements;
- (e) *determining* at least one series of words being most probable to correspond to said speech phrase by applying a predefined language model to said at least one series of hypothesis speech elements,

wherein determining said at least one series of words further comprises:

- (1) *determining* at least one sub-word, word, or a combination of words most probably being contained as a seed sub-phrase in said received speech phrase; and
- (2) *continuing determining* words or combinations of words, which are consistent with said seed sub-phrase as at least a first successive sub-phrase which is contained in said received speech phrase, by inserting additional, paired and/or higher order information, including semantic and/or pragmatic information, between the sub-phrases, thereby decreasing the burden of searching,

wherein the predefined language model contains a low-perplexity recognition grammar obtained from a conventional recognition grammar by:

- (3) *identifying and extracting* word classes of high-perplexity from the conventional grammar;
- (4) *generating* a phonetic, phonemic and/or syllabic description of the high-perplexity word classes, in particular by applying a sub-word-unit grammar compiler to them, to produce a sub-word-unit grammar for each high-perplexity word class; and
- (5) *merging* the sub-word-unit grammars with the remaining low-perplexity part of the conventional grammar to yield said low-perplexity recognition grammar.

(emphasis added)

Therefore, the speech recognition method of claim 1 determines at least one series of words being most probable to correspond to the input speech phrase by inserting additional, paired and/or higher order information, including semantic and/or pragmatic information, between the sub-phrases, thereby decreasing the burden of searching.

By contrast, Jiang “provides a set of likelihoods that a particular sequence of words will appear in the language of interest. ... In one embodiment, the language model is a compact trigram model that determines the probability of a sequence of words based on the combined probabilities of three-word segments of the sequence.” *Jiang, column 4, lines 33-44 (emphasis added)*. Jiang’s method takes a sequence of words and tries to match the sequence to the sequence found in the language model. Although Jiang uses a compact trigram model as a language model to determine “the probability of a sequence of words based on the combined probabilities of three-word segments of the sequence”, Jiang fails to teach or suggest determining at least one series of words being most probable to correspond to the input speech phrase by

inserting additional, paired and/or higher order information, including semantic and/or pragmatic information, between the sub-phrases.

Further, it is stated that Ehsani discloses phrase-based dialogue modeling method for producing low-perplexity recognition grammar from a conventional grammar. However, Ehsani fails to teach or suggest inserting additional, paired and/or higher order information, including semantic and/or pragmatic information, between the sub-phrases. Therefore, Jiang and Ehsani, individually or in combination, fail to teach or suggest all the limitations of claim 1.

Based on the foregoing discussion, it is maintained that claim 1, as presented herein, should be allowable over the combination of Jiang and Ehsani. Since claims 2, 4, 5, and 9 depend from claim 1, claims 2, 4, 5, and 9 should also be allowable over the combination of Jiang and Ehsani. Claim 3 has been canceled.

Accordingly, it is submitted that the Examiner's rejection of claims 1-5 and 9 based upon 35 U.S.C. §103(a) has been overcome by the present remarks and withdrawal thereof is respectfully requested.

§103 Rejection of Claims 6-7 and 10-12

In Section 8 of the Office Action, claims 6-7 and 10-12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jiang in view of Ehsani, and in further view of Chou *et al.* (U.S. Patent No. 5,797,123; hereinafter referred to as "Chou").

Based on the foregoing discussion regarding claim 1, and since claims 6-7 and 10-12 depend from claim 1, claims 6-7 and 10-12 should also be allowable over the combination of Jiang and Ehsani. Further, it was stated that Chou "teaches limited vocabulary word spotting (low perplexity) with a parallel network of subword models used to model the non-keyword

portions of the input utterance (high-perplexity).” *Chou, column 2, lines 61-65*. Therefore, Jiang, Ehsani, and Chou, individually or in combination, fail to teach or suggest all the limitations of claims 6-7 and 10-12.

Accordingly, it is submitted that the Examiner’s rejection of claims 6-7 and 10-12 based upon 35 U.S.C. §103(a) has been overcome by the present remarks and withdrawal thereof is respectfully requested.

Newly-added Claim 14

Based on the foregoing discussion regarding claim 1, and since claim 14 closely parallels, and includes substantially similar limitations as, claim 1, claim 14 should be allowable over the cited prior art references.

Conclusion

In view of the foregoing, entry of this amendment, and the allowance of this application with claims 1, 2, 4-7, 9-12, and 14 are respectfully solicited.

In regard to the claims amended herein and throughout the prosecution of this application, it is submitted that these claims, as Originally presented, are patentably distinct over the prior art of record, and that these claims were in full compliance with the requirements of 35 U.S.C. §112. Changes that have been made to these claims were not made for the purpose of patentability within the meaning of 35 U.S.C. §§101, 102, 103 or 112. Rather, these changes were made simply for clarification and to round out the scope of protection to which Applicant is entitled.

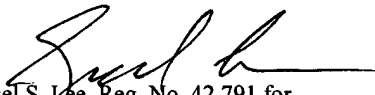
In the event that additional cooperation in this case may be helpful to complete its prosecution, the Examiner is cordially invited to contact Applicant's representative at the telephone number written below.

The Commissioner is hereby authorized to charge any insufficient fees or credit any overpayment associated with the above-identified application to Deposit Account 50-0320.

Respectfully submitted,

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